Origins of the concept: a supply system for lean production

A significant proportion of the research which resulted in the development of the term lean production[1] was devoted to the investigation of the supply system – comprising the purchasing activities of the vehicle assemblers and the supply activities of the component (or component “system”) manufacturers[3]. The first major article on the subject[4] mentioned this. The seminal work by Womack et al.[2] devoted a chapter to the subject, and several subsequent outputs from the International Motor Vehicle Programme stable have concentrated on the supply side[5-7].

Thus, from the outset of the discussion on lean production, there has been a focus on the role of the supply system (or supply chain, network, stream, etc. – the metaphors are many). In the context of the automotive industry, this was natural, since a large part of the manufactured value of the car is provided by component suppliers, and there is evidence to suggest that the same could be true for the designed value in the form of proprietary product technology[8].

Attempts to understand lean production better, and to develop the concepts further and in different sectors, must therefore include an investigation of supply management[10].

Inter-firm supply relationships exhibit very different natures when sectors of commerce and industry, and indeed, different products within one sector, are contrasted with one another. In terms of the technology that differentiates the final product in the mind of the consumer, for example, any one of many situations may exist. The high street retailer selling washing powder is highly dependent on the manufacturer of the product for its technology, just as the computer manufacturer is reliant on the microprocessor producer. The same high street retailer, however, may invest substantial sums in developing, say, a supplier’s food product to the retailer’s own specifications. This was noted in the context of the retail store Marks & Spencer by Tse in 1985:

In order to carry out his task, the [M & S] technologist is seldom found in the office. A part from visiting the stores, he spends a tremendous amount of his time at the suppliers’ plants. He works closely with the manufacturer’s technical personnel and is readily available for consultation and advice. To Marks & Spencer, a manufacturer supplying merchandise to the company is regarded almost as part of the operation[13, p. 92].

At the time, Marks & Spencer had a team of 350 technologists. Other retailers learned the lesson also: for example, in developing a new Brazilian wine for its low price market between 1991 and 1994, the supermarket company Tesco spent...
very significant amounts of time and effort not only in perfecting the taste of the product but also in changing the way the vineyard was managed. The efforts transformed the wine from unpalatable (to Europeans) to a major UK success.

Many manufacturers of electronic equipment, meanwhile, use standard parts to build their products, and provide the differentiating technology of the final product almost entirely from their own research and development resources. This is so, for example, in the case of base stations for cellular communications, where the rapid rate of technological development is being faced principally on the basis of in-house research and development, with suppliers (themselves high technology companies) acting in a “loyal collaborator” mode[14].

The degree to which product technology flows between the customer and supplier depends on the relationship between the two organizations, which is itself usually deemed to be affected by the different levels and types of power which each may exercise[15]. One might expect that, in situations in which the customer is dependent on the supplier because of the nature of the product (e.g. automobiles/components, retailer/washing powder), the inter-firm relationship would exhibit attitudes and behaviour indicative of common interests and collaboration. In fact, such relationships appear to exist only rarely, suggesting that the crude commercial power (i.e. buyer’s market or seller’s market) has more influence than the potential benefits in terms of competitive or attractive final products, which might accrue from efficient flows of technology between the stages of manufacture (and distribution).

The logic of lean production, leaving aside for a moment its implications for working practices and social impact, describes value-adding processes unencumbered by waste (non-value adding activities). This is intuitively appealing in a scientific sense for two reasons:

(1) It implies a total view of the process – from raw material source to end consumer, and perhaps beyond, through recycling of materials.

(2) It does not limit the focus to traditional assumptions on “necessary” or “unnecessary” activities: wasteful practices must be defined anew in the search for lean systems.

It must be said immediately that there have been objections from some observers who feel that a truly lean system would lack the basic flexibility necessary for it to function in a real situation. This flexibility might take the form of “time to think” or “space to experiment”, etc. These arguments are also intuitively appealing, since they reflect personal experiences associated with creativity, enjoyment and survival in a busy, competitive world. Since the concept of lean production grew out of significant observed competitive advantage, and the whole principle is based on the existence of a free market, arguments for the inclusion of non-lean elements in systems (slack) can only be accepted when expressed in terms of adding to competitive advantage in a general, long-term sense. For example, a workforce which has no time to think might not deliver innovation through suggestion schemes, and might dislike their jobs so much that their organization would derive no benefit from their
motivation. A solution to this might be apparent over-manning or time set aside for thinking, neither of which would add value in the short term, justification (and monitoring) being provided in terms of organic benefits to the system (in the sense proposed by Burns and Stalker[16]).

This same argument may be used for the relationship between a manufacturer and its suppliers. A lean supply arrangement should provide a flow of goods, services and technology from supplier to customer (with associated flows of information and other communications in both directions) without waste.

Supply chain management in theory
Supply chain management is a theory grounded in the field of logistics. Introduced by Houlihan[17] in 1984, its development was initially along the lines of physical distribution and transport, using the techniques of industrial dynamics, derived from the work of Forrester[18]. Reflecting this heritage, Christopher[19] observes that “supply chain management covers the flow of goods from supplier through manufacturing and distribution chains to the end user”. Other titles have been given to this concept, but none has stuck so well (although the notion of “pipeline management” is worth exploring)[20].

Recently, research on supply management has focused on a debate regarding the need for closer relationships between customers, suppliers and other relevant parties, in the search for competitive advantage. The arguments for closer relationships begin with the firm theories of Coase and the transactional economics work of Williamson, sometimes addressing the interorganizational relationships concepts of writers such as Van der Ven, which led theorists to identify the concepts of “networks”, as opposed to supply chains[21].

There is evidence of benefits accruing to proponents of close relationships – sometimes called supply partnerships – and also suggestions that initial attempts have not always brought the expected prizes. For benefits, see [26-33] and for an account of benefits not realized, see [34]. Some have suggested that such ideas are only for large organizations[35], while others have shown that small firms expect and plan to gain benefits from developing close relationships[36].

The theory of supply chain management holds that, for the eventual product or service to be commercially advantageous to the organizations involved in its creation and provision, value must be added to a process faster than cost. The meaning of value derives from the consumer market and is translated back along the processes in the supply chain. The simplicity of this idea has led over the last century to a focus on the short-term implications of supply: optimization of individual benefits within a market-driven context, or “dog eat dog”. The only supply chain that has been clearly incorporated into general management of organizations, therefore, has been that between stages in the internal process: materials supplied to production; information supplied by designers to cost accountants; demand figures supplied by market planners to production planners; products passed from production sales, and so on. Relationships in such internal supply chains have been typically poor – with departmental, functional, professional and divisional separations reinforced by
the strengthening provided by the “common enemy” syndrome, underpinned by the propensity to blame others for any mistake, in order to protect one’s own position and continued employment.

Beyond the traditional boundaries of the firm, however, the focus on value and cost accumulation has been limited to the mechanics of purchasing (e.g. negotiation) and logistical issues (e.g. elimination of noise in supply systems). The focus on partnerships in supply provides a welcome challenge to organizations and researchers, perhaps heralding a change in organizational shape and form, rather than a new tactic in short-term goal optimization.

In the retailing sector, a concept known as “efficient consumer response” (ECR) has been developed in the USA [37] to describe supply chain management with a focus on the final customer for a product (or, in theory, a service). This concept is akin to others, such as vendor managed inventory, co-managed inventory, etc., each adding an extra emphasis on modifying traditional behaviour in supply chains. Associated practices include “efficient replenishment”, “continuous replenishment” and “cross docking”, each relating the concept of customer service to a practical logistics technique. While such techniques are still young, there are many ways in which logistical advantage may be sought by varying the perspective taken (e.g. whose responsibility is it to ensure that products are on the shelves in the shop or store?).

Similarly, developments in information technology have provided new opportunities for supply chain managers to improve their control of logistics – by enabling information to be shared between parties (e.g. via electronic data interchange), responsibilities to be realigned (e.g. so that the supplier may access stock level data and take the necessary replenishment action) and new directions taken in strategic development[41].

Fundamental to the theory of supply chain management is the notion of exercising control of an identified sequence of activities from a vantage point. This vantage point is usually occupied by the firm or organization conducting the last significant transformation of the product before it reaches the consumer (through the downstream supply chain). Thus the manufacturer of televisions looks back (upstream) at its suppliers of raw materials, components, packaging, etc. and decides who should play which role, and forward, via the distribution network, that dances to its tune. In the case of a service, the organization which is in direct contact with the consumer may be expected to occupy the vantage position (e.g. a hotel or an airline). The components suppliers in the first case might describe themselves as being in the television manufacturer’s supply chain. The providers of laundry services to the hotel, or bread rolls to the airline, might take a similar view.

This notion is unfortunately linked to the aphorism that holds that “the customer is never wrong”[42]. The corollary to this is that, in a dispute, the supplier must be at fault. This is a feature of supply chain management – possibly a fundamental flaw – that we shall explore below. It is also a differentiator in this discussion, since it would have no place in lean supply.
Lean supply in theory
In lean supply, the entire flow from raw materials to consumer is considered as an integrated whole. Interfaces between stages (i.e. between companies - suppliers and customers) are thus seen as artificial - created not as natural transformation stages in the development (or addition) of value, but as a result of the economic arrangement of assets (boundaries of firms) governed by many other factors (e.g. labour skills, convenient configurations of technology, geographical location of raw materials, etc.).

The fundamental principle of lean supply is that the effects of costs associated with less than perfect execution of a sub-process are not limited to the location of the execution. In other words, the need for, say, a progress chaser within the customer's organization, to expedite deliveries traditionally arriving late from the supplier, is to the detriment not only of the customer, but also of the supplier - in fact of all the suppliers, even those whose delivery performance does not warrant expedition. This is a fundamental point, since lean supply does not recognize the traditional positions of customer and supplier, which tend to obscure the central quest for the removal of waste. In the example given above, suppliers developing lean supply would identify the costs to them of dealing with a customer that needed progress chasers to manage deliveries, and switch, in the long term, to those which did not. In this way, the lean suppliers will ensure that their value is transferred to the end consumer in the most efficient way, thus ensuring their survival[44].

Similarly, while the pressure placed on the customer by the end (consumer) market, for lower retail prices, and thus reduced production costs, may be logically passed on to the suppliers of materials and components, any departure from perfect execution within the supplier's operation thus caused is of concern to the customer, as well as to the supplier. Thus, the early attempts to implement just-in-time operation, which resulted in problems (as embodied in inventory) being passed back along the supply route to suppliers, failed to recognize that the impact of the problem had not been removed[46].

This realization may be characterized as the customer and supplier being “in the same boat”, or, perhaps, by the concept of “mutual destiny” recognized by neighbours in the supply chain. It is certainly a close relative of the development of process-oriented organizations (as opposed to functionally oriented).

Lean supply may be summarized, therefore, as the product of an operating attitude that recognizes the cost associated with any departure from perfect execution of the tasks necessary to provide long-term customer satisfaction, thereby achieving total eradication of those costs. While in theory it is an absolute, in practice it may be acceptable to be leaner than competitors while never achieving total “leanness”. At the level of overall operation (or total supply chain) it may be impracticable to achieve such philosophical perfection. At the level of a specific point in a supply chain, however, it should always be possible to identify whether or not the current practice is lean, and perhaps how far towards total lean operation it might be possible to move.

A discussion of three specific features of the theory of lean supply at this point should help in the subsequent comparison of lean supply and supply
chain management: cost transparency, relationship assessment, and excuses and blame.

Cost transparency
In attempting to control the supply chain from their vantage points, customers have developed techniques which are known collectively as “open-book negotiation”. In fact, this is not a new concept, but a traditional ploy of purchasers, used to obtain increased power over suppliers. The reasoning goes something like this: the customer would like to help the supplier to improve (“supplier development” – discussed below) in order to become more competitive. If the supplier is competitive, then both the customer and supplier should benefit. The customer has expertise (e.g. in production engineering) and thus, if the supplier reveals all the cost data relating to the process that results in the product or service that is being provided to the customer, it should be possible to generate improvements, solve problems, etc.

Best practice in supply chain management might therefore be expected to include a process of formalized open-book negotiation.

Suppliers are, of course, not fooled by this for one moment. Why should the customer be intrinsically able to help the supplier to improve? In the case of, say, a vehicle manufacturer discussing panel stamping with its tooling supplier, there is an apparent logic to the argument. But, what does the airline know about baking bread rolls?

In the famous cases of strong customers developing so-called “philosophical” approaches to operations (e.g. Toyota production system[47]) the influence on the supplier might be profound and not limited to product/service specific improvement. Items such as “housekeeping”, “employee development”, and even good general business management might be areas where an accomplished customer might help a (very grateful) less developed supplier. Open-book negotiation is typically not this way, however, and has gained a bad (or at least doubtful) reputation because of its use as “just another weapon in the customer’s arsenal”[48].

As noted above, lean supply does not recognize artificial boundaries in the flow of supply invented for the convenience of commercial arrangements. The search for improvements is an essential part of lean supply (i.e. inter-firm kaizen) but there is no natural reason why this should not take place in several directions: at least two – the customer’s involvement in the supplier’s process and vice versa.

For lean supply to be a reality, therefore, customers must share process information, including cost data, with suppliers and accept ideas that come from upstream, as readily as they expect to influence their supply chain partners. They are survivors in the same boat – joint guardians or stewards of the same “value-in-transit”.

Relationship assessment
Another practice developed from the vantage point syndrome is that of vendor assessment. We have dealt with this elsewhere[49] but a brief summary is worthwhile here.
The original approach to vendor assessment was based on the customer assessing the supplier – applying techniques and processes with steadily increasing levels of sophistication, during the 1970s and 1980s.

During the late 1980s, some purchasers began to see the fatal flaw in the traditional version of vendor assessment – the complacency derived from the vantage point. Customers might be able to criticize – and even improve – suppliers, on the basis of vendor assessment schemes, but might themselves remain very bad (inefficient) customers, without the benefit of the suppliers' criticism, experiences and viewpoints. Best practice in supply chain management might therefore be expected to include some formalized scheme for two-way assessment: the customer assesses the supplier's performance, at the same time asking for feedback on how good a customer they are. In lean supply, however, this context is revealed as flawed. Even if the organizations in the supply chain could be optimized through this process (itself a very doubtful premiss) the health of the vital link in the chain – the supply relationship – would not be addressed. Thus, it is necessary to develop relationship assessment programmes, in order to focus on the critical feature of supply – the way in which value flows from one organization to another[50].

In order to develop this, a customer would have to adopt considerable humility – in agreeing that the supply relationship was a jointly “owned” entity, with the supplier having an equally important view on its development. This is not yet a commonly apparent feature of supply chain management.

Excuses and blame
A common feature of operating systems is the use of excuses and blame by its managers. When something goes wrong, it is usual to make an excuse, in order to avoid penalty, and to blame another party for the problem and thus not only avoid penalty to oneself, but possibly gain some “moral high ground” type of advantage over the blamed party.

Excuses and blaming result in increased process cost for the party using them, since the problem that has given rise to their use is not resolved but stored for future re-emergence. The opposite of this process is embodied in such practices as the “five whys” and Ishikawa diagrams, employed in total quality management[51,53].

The false importance given to the interfaces in supply chains (i.e. the focus on each firm's fate in isolation) gives an opportunity for the use of blame and excuse and is in part dependent on it: (“It wasn't this company's fault – the supplier let us down”).

The luxury of this laxity is denied by lean supply. Problems that occur are targets for solution, not opportunities for reinforcement of artificial impediments in the flow of the supply chain. Lean supply therefore may be seen at best as a “no blame-no excuses" culture, or at least as one in which blames and excuses are identified and costed. The cost of blaming may then be attacked in similar ways to the cost of non-quality, again a feature of total quality. The concept of “honesty” that is embedded in this proposition may
seem far fetched. It is, however, precisely the same concept that underpinned the massive success of the Quakers in the nineteenth century[54-56].

The techniques contained in the strategies of “efficient consumer response”, “vendor managed inventory”, and the exploitation of new information technologies to remove delay and duplication in the supply system find resonance in lean supply – a similar approach of modifying basic assumptions may be seen to apply, with the same acceptance of new roles for suppliers and customers – beyond traditional hierarchical stances.

It may be seen, therefore, that the theory of lean supply calls for development of revised attitudes in purchasers and suppliers. The concept of the vantage point is not helpful in developing genuine shared benefits and, indeed, while some degree of leadership might be necessary in any given supply situation, the notion of customer infallibility may be leading purchasers to a fatal misconception.

**Current best practice in supply chain management**

It must be said at the outset that the term best practice is intuitively unappealing. The suggestion that anything can be called best attracts criticism from two fronts: that challenging the idea of universal applicability (the “horses for courses” argument) and that supporting continuous improvement (the “best is the enemy of better” concept). Since research in the area of operations management is intrinsically linked with practical considerations, however, the concerns of managers are close to its heart and influence both the direction and nature of conceptualization. The identification of some best practice is, perhaps, more attractive to the practitioner, who has to survive today as well as envisage tomorrow – a notion that is supported by the growth in popularity of benchmarking projects over the past decade.

In attempting to manage, or conceptualize, the complex relationships between business organizations, there can be no authentic, identifiable best practice – there are simply too many variables. We may speak, however, of beneficial practice – that combination of practices and concepts which appears, within a discrete time frame, to provide some competitive advantage to a business organization. The most beneficial practice might, within a limited context, be termed the “best”.

So, what might best practice in supply chain management look like?

One of the defining features of supply chain management (as opposed, for example, to purchasing) is the extent of vision required on the part of managers, with respect to their value-adding system, and the influence they must seek to have over it. It has become fashionable to speak of tiers of suppliers – a term taken from the Japanese keiretsu form of organization, in which suppliers close to the final industrial customer (i.e. that firm whose market is the consumer) play a strategic role, marshalling the efforts of their own suppliers who are seldom in touch with the eventual customer, and so on down the supply base structure. In fact, there is much more to tiering than simply requiring some suppliers to report to others: the horizontal links within a tiered supply base are of crucial importance (as they are in other types of tiering, e.g. theatre seating). The concept of the kyoryokukai or supplier organization is a newcomer to
western management, but may represent a fundamental shift in practice, within the context of supply chains (see [57]).

Best practice must, it would seem, take account of a structured view of the entire supply chain, presumably with greater detail of the operations closest to those of the firm itself (however it is organized and bounded), and some form of horizontal structure, to provide stability for the supply base. The early work on industrial dynamics set the scene for the role of information systems within supply chains - from Forrester's anomaly of distortion to the simplicity of the kanban in just-in-time systems. Clearly, a strategy for managing information smoothly and effectively is essential for supply chain management[41].

Strategies for supplier development: cascade versus intervention
As discussed above, the concept of supplier development arose from the practices of open-book negotiation and vendor assessment, coupled with the hegemony of successful companies and the conviction of infallibility on the part of customers.

In addition to this, the past three decades have seen the growth of awareness, in the West, of the importance of product quality in global competition (especially in contrast to the successful developments in this respect in Japanese exports), and a resultant widespread emphasis on “total quality”. The standards and ISO 9000 has reinforced the fashion for customers to develop their own supplier performance criteria and exclude suppliers that fail to conform. Two strategies have emerged from this practice, named, for the purposes of this discussion, cascade and intervention.

The cascade metaphor is not new in management terms: the suggestion is that some decision is taken at a “high” level and the implications flow down to lower levels which, in turn, pass them on to their subordinates, and so on, like a cascading fountain. It is a term frequently used in practice, in the field of policy making. Its use in the area of supply, however, requires acceptance of the customer occupying a higher position than the supplier (the “vantage point”)[58].

The cascade strategy in supply chain management thus entails passing the customer’s ideas to the supplier, assuming that they will pass “downwards” to the supplier’s suppliers, and so on. The customer sits atop a pyramid of companies, each of whom is “washed” with the same policy which originates on high. Forgetting for a moment the invidious implications of this rather crude hierarchical model, let us consider the likely effects of this approach.

First, the cascade model assumes that it is sufficient for the customer to dictate and to delegate responsibility for implementation of the policy. This would be the case in a statement such as: “All our suppliers are required to become certified to ISO 9000. After 1 January 1995 we shall only buy from suppliers who have achieved this”. A similar case would be represented by the substitution of a company specific vendor assessment scheme in place of ISO 9000.

An apparently more justifiable cascade approach might be, “The supplier’s competitive position is his own concern: we will deal only with those suppliers who can meet our requirements and survive in a competitive market”. The practical manifestation of this policy, of course, is traditional competitive tendering. The effect of either of these strategies is to emphasize the divide
between customer and supplier. This is a competitive position between parties who need each other to survive. The supplier will react accordingly to the message such a strategy imparts: traditional interaction is based on the assumption that the other party (customer or supplier) will employ guile. Taken to the extreme, this situation can paralyse entire industries[60].

The cascade strategy has clear potential as a “weeding out” tool, a necessary item for many purchasers in the process of rationalizing their supply bases[61]. Despite its shortcomings in a more mature situation, however, it is still widely used in supply chain management. The alternative to cascade is intervention. This strategy is based on the belief that the customer is able to intervene in the supplier’s business operations and bring about change for the better – so called “supplier development”. As noted above, this term has paternalistic overtones – implying that it is only the supplier that needs to develop (or be developed) and that the customer can see how to do this (from the vantage point).

In practice, two sorts of intervention strategy are apparent. In the first, the customer takes the paternalistic role (“We send a team of experts to the supplier to sort out his business and recommend action”). In the second, the approach is more co-operative – the customer’s experts work side by side with the supplier’s personnel, in order to develop improvements through joint effort.

The UK automotive industry provides an example of this. Two of the key vehicle manufacturers (VM-A and VM-B) currently operate intervention schemes that appear similar until examined closely. Both have the concept of a quick response improvement – identifying an opportunity for improvement in a day or two of discussions and implementing it in a further three days. A large part of the efficacy of this technique is due to the sense of urgency which it creates. As happens with some crash diets, however, unless the work done is consolidated, it is likely that the benefits will be short lived. The policy of VM-A is to intervene for three days, in which time the supplier and customer identify an opportunity, implement the improvement and measure the benefit. Following this, VM-A withdraws and expects the supplier to carry on the good work – a switch from intervention to cascade. VM-B has the same initial technique, but follows the intervention with a further team visit some days later. The members of this second team remain with the supplier until everyone is satisfied that the improvement has been integrated into working practices. Thus, intervention may be seen to be more than the opposite of cascade: it is a multi-stage strategy, with different types of intervention being employed, as appropriate.

The cases of Marks & Spencer and Tesco, referenced above, provide other examples of intervention strategies. In both cases, the customer may be said to have adopted a benevolent approach, the results of which left the supplier arguably better suited not only to that customer’s requirements but also to the wider demands of the market in general. Best practice in supply chain management might therefore be expected to include some mix of strategies – cascade and intervention – designed in contingent fashion to be adapted to the needs of the relationship. The customer must ensure that the supplier is not insulated from the consumer market forces (as might happen, for example, in the case of vertical integration – which might be characterized as a “total
intervention” strategy) but must also recognize the common interests which may be served by a shared response to competitive pressures.

**Lean supply versus partnership – an example**
In order to illustrate the differences between lean supply and intervention strategy in supply chain management, we may consider the case of an Italian manufacturer, identified here as “Ditta SpA”. This company is located in north east Italy and manufactures a high technology, high complexity product that fits into its clients’ products, to be marketed to consumers. The clients are all skilled in manufacturing processes similar to those conducted by Ditta but are accustomed to working in high volumes. Ditta, on the other hand, has chosen to specialize in making high profile, niche products (or systems which constitute large parts of them) for its clients to market.

A French client has been dealing with Ditta for many years but has only recently begun to treat the Italian firm as a partner. In fact, although the systems that Ditta makes constitute almost the total value of the French client’s product (i.e. the “package” that it sells to consumers) in some cases, the relationship has been one of master-servant, with Ditta allowed to make only minor decisions in sourcing components. This is a very limited expectation for the French client to exhibit in respect of a first-tier supplier.

As part of its supplier development programme, the French client has now started to intervene in Ditta’s supply operation. Ditta has its own supplier accreditation (vendor assessment) scheme, but the French client insists on visiting the second-tier suppliers itself. This is an intervention strategy which may only be considered part of a partnership approach if it is conducted in a co-operative manner. In this case, however, the visits to second-tier suppliers are characterized by the French client’s representatives insisting on activities being done in the way they stipulate, embarrassing Ditta in front of its suppliers. Ditta cannot refuse the client’s proposals, even though it often has a better way to solve a particular problem. It also needs to develop its relationships with suppliers but finds the intervention of the French client disruptive in this respect.

Finally, the French client exhibits nationalist tendencies, often refusing to condone Ditta’s choice of supplier, requiring instead that a French firm is awarded the business. If Ditta persists and does manage to gain agreement for one of its partner suppliers to supply a component in preference to the choice of the French client, it feels that the French are “just waiting for something to go wrong – to say I told you so”. The French client is using a vantage point-intervention strategy in this case. As a result, it is unable to develop lean supply, since the potential contribution of Ditta is not valued. Ditta’s strategy is to develop lean production in its own operation and to demonstrate to the client – and others – that it is capable of running its own supply base, perhaps with co-operative, rather than dictatorial, intervention from the client.

**Conclusion: lean supply as a challenge for supply chain management**
The challenge of lean supply for proponents of supply chain management is to redesign the way in which responsibility for value management is shared, in
order to exploit expertise wherever it lies in the chain and to recognize the impacts in one part of the chain of decisions made in another. The precepts of vantage point and customer superiority that are central to supply chain management are directly contrary to those of lean supply. Though leadership and initiative are necessary parts of continuous improvement, preconceived, intransigent ideas of who should play such roles are not productive in the long term in a supply relationship.

The theory of lean supply does not lend itself to straightforward implementation. The implicit attitudinal shifts may be more difficult to achieve than the practical approaches of vendor assessment and open book negotiation, or the strategic choices of intervention or cascade. However, lean supply, as lean production, derives from market competition: its exploitation may not be a matter of choice for very long.

Notes and references

1. International Motor Vehicle Programme, MIT, Cambridge, MA, 1986-1990. This research is reported in [2].
3. Eleven of the 55 researchers involved in the project were engaged on research in this area. In addition, later activities on the central benchmarking work incorporated supply issues, from the assembler’s point of view. Several of the industrial sponsors of this research were component manufacturers.
8. This is discussed at length in Lamming[6] and by Clark and Fujimoto[9].
10. The term “supply management” is used in the sense proposed in Králíček[11] as a replacement for less satisfying terms such as “purchasing” or “procurement” (with too much emphasis on the act of spending money) and “supply chain management” (an incomplete metaphor – see New[12]).
14. This term was developed by Lamming[6].
20. Farmer, D.H. and Ploos van Amstel, R., Effective Pipeline Management: How to Manage Integrated Logistics, Gower, Aldershot, 1991. This is worthy of note not only because it was derived by some of the leading thinkers in the area, but also because it raises the question of key influences in the flow.
21. The original work in Coase[22] provides the starting point for discussions on inter-firm relationships, largely developed by the equally important work of Williamson[23]. The organizational context is developed further by Van de Ven et al.[24]. These three sources led to the work of the so-called “Industrial Marketing and Purchasing” group summarized well in Ford[25].
37. The notion of efficient consumer response appears to have little depth to it, consisting, in the literature, mainly of a series of checklists and generalized good intentions (i.e. with regard to customer service). It is, nevertheless, being developed and explored and may give way to some deeper concept regarding interaction of customers and suppliers in supply chains (see[38-40]).


42. The phrase is attributed to H. Gordon Selfridge, an American founder of the British department stores which bear his name[43].


44. This is akin to the notion of the gene as a long-term survivor (as proposed by Dawkins[45]). The surviving entity in this model – the gene – "uses" bodies in which it exists, to ensure its survival. In the commercial version, the value that reaches the consumer may be seen to use the business organizations through which it passes. In order to survive, the value must choose efficient organizations.


46. In a study by Sako et al.[34] over half of all automotive components suppliers in the USA, nearly a half (46 per cent) in Europe, and just over a third of all suppliers in Japan agreed with the statement: "JIT only transfers inventory responsibility from customers to suppliers". In both the USA and Japan, the statement was less likely to be endorsed by suppliers with partnerships (one-third in the USA and 30 per cent in Japan).


48. Quote from a UK materials supplier in a recent postal survey.


50. The concept was first introduced in Lamming[6] and is discussed further in Lamming et al.[36].

51. For an explanation of total quality techniques such as these and "the five whys", mentioned later, see [52].


58. It is a curious anomaly that proponents of supply chains frequently use two directly conflicting terminologies simultaneously. The suppliers are upstream of the customer (who should thus look “up” to them) and yet ideas and requirements may be passed, or cascaded, down to suppliers. It may be that preoccupation with the Japanese “tiered” model is responsible for this. The jargon of strategy compounds the issue, speaking of backward integration when referring to a takeover of a suppliers operation – a horizontal metaphor.


60. For an account of such paralysis in the UK automotive components industry, see [59].